REMARKS/ARGUMENTS

Claims 1-3, 5-7, and 9-20 are currently pending. Claims 1-3, 5-7, and 9-20 stand rejected. By this amendment, independent claims 1 and 14 are amended.

Applicant's invention

The instant invention provides a method for improving the throughput in continuous electrodialysis processes wherein the potential output of electrodialysis cells is increased by as much as a factor of 10,000 over the best commercially exploited electrodialysis methods. The present method achieves this remarkable improvement through the addition of a self-regenerating buffer to the product streams (i.e. the acid-loop and base-loop solutions). Discussion of the addition of buffer to product stream is found in the Specification, page 7, lines 26-30.

Mani and *Scheder* do not Control pH within the Feed or Product Streams and Controlling pH within Product Streams would Defeat the Purpose of *Scheder*

Claims 1-3, 5-7, and 9-20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Mani, U.S. 6,621,225 (hereinafter "*Mani*") in view of Scheder, U.S. Patent No. 3,595,766 (hereinafter "*Scheder*"). Claims 2-3, 5-7, 9-13; and 15-20 depend, directly or indirectly, from presently amended independent claims 1 and 14, recite additional features thereto.

Applicant submits that, the references when considered individually or combined together, do not describe the method as now claimed or approach the method now claimed. Specifically, neither reference anticipates or suggests adding buffer directly to product stream in an electrodialysis process. Also, neither prior art patent suggests that maintaining pH within a narrow range is necessary or desirable and so the prior art fails to suggest the means of accomplishing this balancing.

Lastly, the Examiner's combination teaches away from the present method's buffers. The two patents teach that in order to preserve the purity of the product

stream, the buffer should not be introduced into the product stream. This is contrary to the invention as claimed.

Mani and *Scheder* combined do nothing more than suggest that changes to pH levels in the main chambers of the cells are acceptable, as long as, per *Mani*, the pH of the cells remains under 14, and per *Scheder*, the electrolyte stream pH is controlled. Applicants note that *Scheder* adds buffers to the electrolyte stream because that is where its undesirable reactions occur. *Scheder* Figure 2 clearly shows that the buffer (36) is added solely to the electrolyte chambers (17). The present invention takes a different approach not suggested by *Scheder* inasmuch as the present invention introduces buffers directly into the product stream.

Not only does *Scheder* fail to teach the introduction of the buffer to production streams, the *Scheder* invention cannot be adapted to follow the same methodology as the present invention. The production stream in *Scheder* is whey, a nutrient. *Scheder* cannot be adapted to add the buffer to the production (whey) stream inasmuch as the purpose of *Scheder* is to purify the whey by removing minerals therefrom. The addition of any buffer to the whey, as the present invention teaches, would irrevocably contaminate the product stream. (See Sec. 1.132 Affidavit, attached).

Given that the very purpose of *Scheder* (pure whey) would be defeated by following the approach of the present invention, *Scheder* is not proper prior art under MPEP § 2143.01, citing *In Re Gordon.*[1]

Present Invention Proactively Controls pH while *Mani* relies upon Naturally-Occurring pH Control

The electrodialysis cells used by the Mani invention are able to withstand large swings in pH because the cells have low efficiency (i.e., the "dwell time" of fluids in the stack is short). For example, Mani teaches that only a low level of pH control must be maintained[2] and further, that *natural* production of ammonia will maintain pH swings

[1] "If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)." MPEP §2143.01.

[2] Per *Mani*, pH should be controlled to fall within 5-14 pH. *Mani*, Col. 12, Line 3. This range groups such different solutions as acid rain (pH 5) and highly caustic drain cleaner (pH 14).

within the range of pH of 7 to 13.5.[3] This range of 6.5 units is perfectly acceptable to *Mani* and prior art devices presently on the market, because such pH swings are tolerable when the efficiency of the stack is low, when low current density is used, when high flow rates are used, and/or when short stacks are utilized.

The present invention takes the opposite approach from that taken by *Mani* or other prior art devices. Instead of relying on natural processes to maintain the pH levels within the ED cell, the present invention takes a proactive approach to limit the pH swings to within one unit pH (dependent claim 15) or within two units pH (independent claim 14). This control of pH within the system is integral to the efficiencies gained by the present invention as low swings in pH allow high current densities, low flowrates (i.e. long dwell times of solutions within the stacks), and long ED stacks to be used in the present invention as compared with prior art. Control over pH of the solution within the ED cells in the present invention is the key to its benefits.

A Combination of *Scheder* and *Mani*
Teaches away from the Present Invention

Scheder excludes anionic membranes to prevent precipitation, to wit:

> Firstly, it was observed that the anion membranes have a tendency of rapid clogging, as a result of which the cell output is progressively diminished...for the foregoing reasons, I concluded that anion membranes should be eliminated altogether and replaced by neutral membranes having substantially no fixed charges.

Scheder, Col. 1 lines 44 to 59.

Scheder also discloses that precipitation contributes to the failure of the system which occurs when the throughput of the system is increased.[4] *Mani*, however, teaches that anionic membranes are to be used in the stack.[5] As the attached affidavit explains, the use of neutral membranes is a critical element of the *Scheder* invention. *Mani* therefore directly conflicts with *Scheder* which imposes a ban on anion membranes. Where the prior art contains apparently conflicting teachings each reference must be considered "for its power to suggest solutions to an artisan of ordinary skill. . . .

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[3] *Mani*, Col. 12, Lines 7 to 13.
[4] *Scheder,* Example 4: Col. 5 Lines 19-29.
[5] *Mani*, Col. 4, Lines 26-35.

considering the degree to which one reference might accurately discredit another." Medichem, S.A. v. Rolabo, S.L., 437 F.3d 1157, 1165 (Fed. Cir. 2006). Here, *Scheder* clearly teaches that neutral membranes in place of anionic ones are required to prevent precipitation and nothing in *Mani* suggests that this teaching is incorrect and as such any combination should exclude anion membranes.

The present invention, as presently claimed, includes both cationic and anionic membranes (see claim 14). The present invention relies on this arrangement. Evidence rebutting a prima face case of obviousness can include evidence that the prior art teaches away from the claimed invention in any material respect. In re Sullivan, 2007 U.S. App. LEXIS 20600, at *13 (Fed. Cir. August 29, 2007). Here, a combination of *Scheder* and *Mani* (and especially *Scheder)* teaches away from the use of anionic membranes.

Thus, overall, the present invention's use of buffers within the product stream is not disclosed by *Mani*, *Scheder*, or any combination of the two. Neither reference or combination suggests or teaches the use of buffers in product streams. *Mani* teaches that even large changes in pH are acceptable, while *Scheder* introduces buffer only on the edges of the electrolyte cell. As now claimed in the amended independent claims, the present invention seeks to introduce properly matched buffer throughout the electrodialysis cell thereby resulting in improvements in efficiency foreclosed by *Mani* (which allows pH swings) or *Scheder* (which must limit the buffer to isolated electrolyte streams). As such, for the reasons explained above, the present invention is not disclosed or rendered obvious by the cited references which actually teach away from the method used by the present invention.

In light of the foregoing, Applicant submits that, as amended, the claims are now allowable. Withdrawal of the rejection and allowance of all the currently-pending claims is respectfully solicited.

An earnest attempt has been made hereby to respond to the July 2, 2007 Official Action. All claims are deemed in condition for allowance. If the Examiner feels that a

telephonic interview will expedite allowance he is respectfully urged to contact the undersigned. Claims 1-3, 5-7, and 9-20 are currently are pending in the application.

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Respectfully submitted,

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